## Claims

What is claimed is:

1. An antireflective hardmask composition comprising:

a fully condensed polyhedral oligosilsesquioxane, $\{RSiO_{1.5}\}_n$, wherein n equals 8; and

at least one chromophore moiety and transparent moiety.

2. The composition of claim 1, comprising from about 50 wt.% to about 98 wt.%, on a solids basis, polyhedral oligosilsesquioxane.

3. The composition of claim 1, comprising from about 70 wt.% to about 80 wt.%, on a solids basis, polyhedral oligosilsesquioxane.

4. The composition of claim 1, wherein each chromophore moiety is selected from the group consisting of phenyl, chrysenes, pyrenes, fluoranthrenes, anthrones, benzophenones, thioxanthones, anthracenes, anthracene derivatives, 9-anthracene methanol, phenol thiazine, non-aromatic compounds containing unsaturated carbon to carbon double bonds, compounds containing saturated carbon to carbon bonds and compositions comprising at least one of the foregoing chromophores.

5. The composition of claim 1, wherein each transparent moiety is substantially free of unsaturated carbon to carbon double bonds.

6. The composition of claim 1, wherein at least one transparent moiety comprises fluorine.

7. The composition of claim 1, wherein less than or equal to about 50 percent of the transparent moieties present are free of unsaturated carbon to carbon bonds.

8. The composition of claim 1, wherein each transparent moiety is transparent to 157 nanometer radiation.

9. The composition of claim 1, comprising an equivalent number of chromophore and transparent moieties.

10. The composition of claim 1, further comprising a crosslinking component.

11. The composition of claim 10, wherein the crosslinking component is selected from the group consisting of epoxides, alcohols, aromatic alcohols, hydroxybenzyl, phenol, hydroxymethylbenzyl, cycloaliphatic alcohols, cyclohexanoyl, non-cyclic alcohols, fluorocarbon alcohols, aliphatic alcohols, amino groups, vinyl ethers and compositions comprising at least one of the foregoing crosslinking components.

12. The composition of claim 10, comprising less than or equal to about 50 wt.%, on a solids basis, crosslinking component.

13. The composition of claim 10, comprising from about five wt.% to about 25 wt.%, on a solids basis, crosslinking component.

14. The composition of claim 1, further comprising an additional crosslinking component.

15. The composition of claim 14, wherein the additional crosslinking component is selected from the group consisting of glycoluril, methylated glycoluril, butylated glycoluril, tetramethoxymethyl glycoluril, methylpropyltetramethoxymethyl glycoluril, methylphenyltetramethoxymethyl glycoluril, 2,6-bis(hydroxymethyl)-p-cresol, etherified amino resins, methylated melamine resins, N-methoxymethyl-melamine, butylated melamine resins, N-butoxymethyl-melamine, bis-epoxies, bis-phenols, bisphenol-A, and compositions comprising at least one of the foregoing crosslinking components.

16. The composition of claim 1, further comprising an acid generator.

17. The composition of claim 16, wherein the acid generator is selected from the group consisting of 2,4,4,6-tetrabromocyclohexadienone, benzoin tosylate, 2-nitrobenzyl tosylate, alkyl esters of organic sulfonic acids, and combinations comprising at least one of the foregoing acid generators.

18. The composition of claim 16, wherein the acid generator is a thermal acid generator.

19. The composition of claim 16, comprising from about one wt.% to about 20 wt.%, on a solids basis, acid generator.

20. The composition of claim 16, comprising from about one wt.% to about 15 wt.%, on a solids basis, acid generator.

21. A method for processing a semiconductor device, the method comprising the steps of:

providing a material layer on a substrate;

forming an antireflective hardmask layer over the material layer, the antireflective hardmask layer comprising:

a fully condensed polyhedral oligosilsesquioxane, $\{RSiO_{1.5}\}_n$, wherein n equals 8; and

at least one chromophore moiety and transparent moiety.

22. The method of claim 21, further comprising the steps of:

forming a radiation-sensitive imaging layer over the antireflective hardmask layer;

patternwise exposing the radiation-sensitive imaging layer to radiation thereby creating a pattern of radiation-exposed regions in the imaging layer;

selectively removing portions of the radiation-sensitive imaging layer and the antireflective hardmask layer to expose portions of the material layer; and

etching the exposed portions of the material layer, thereby forming a patterned material feature on the substrate.

23. The method of claim 22, further comprising the step of removing remaining radiation-sensitive imaging layer and antireflective hardmask layer from the material layer.

24. The method of claim 22, wherein the radiation is ultraviolet radiation having a wavelength of less than or equal to about 200 nanometers.

25. The method of claim 22, wherein the radiation is electron beam radiation.

26. The method of claim 21, wherein the material layer comprises a material selected from the group consisting of a conductive material, a semiconductive material, a magnetic material, an insulative material, a metal, a dielectric material and combinations comprising at least one of the foregoing materials.

27. The method of claim 21, wherein the material layer comprises at least one of an oxide, a nitride, a poly silicon and a chrome.

28. The method of claim 21, wherein the antireflective hardmask layer has a thickness of from about 0.03 micrometers to about five micrometers.

29. The method of claim 21, wherein the forming step comprises the step of baking the antireflective hardmask layer.

30. A patterned lithographic structure, comprising:

a substrate;

a material layer over the substrate;

a patterned antireflective hardmask layer over the material layer, the patterned antireflective hardmask layer comprising:

a fully condensed polyhedral oligosilsesquioxane, $\{RSiO_{1.5}\}_n$, wherein n equals 8;

at least one chromophore moiety and transparent moiety; and

a patterned radiation-sensitive imaging layer over the antireflective hardmask layer.